The Canadian Entomologist

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THE SILK SPUN BY THE LARVAE OF CERTAIN SOCIAL WASPS.

BY PHIL RAU,

Kirkwood, Mo.

The larva of *Vespa maculata* spins for itself an entire cocoon, a cell lining, plus a lid to its cell. The number of these linings, placed one atop another, shows how often the cell has been occupied by these young wasps. The masses of hard, chalky, red material found in each cell also show by their number how many times the compartment has been used. Each silken lining can be peeled off; each bag is complete, and at its bottom is this hardened mass of excrement. When one makes a cross-section of the nest, one finds mass upon mass at the bottom of the cells, but each mass is distinct, separated from the others by this tissue. Thus the living larva, although it must accept an old second or third-hand cell, does not come in contact with the refuse of its predecessor from the time when it is large enough to spin its own covering. We can hardly say that the spinning of this cell lining is a provision of Nature for the protection of the young wasp from contamination, because, if it happens in this case as in most other species that the larvae spin just before pupation, then through its delicate and susceptible days the larva must be exposed to this refuse, and the direct benefit to the larva of protection at this late date would be negligible.

In at least two species of *Polistes*, *P. annularis* and *P. pallipes*, we already know that the larva spins the lid to the cell. In addition to making the lid, the larva of both species will, whenever the cell is too small, add several rings of silk to enlarge and extend the cell before spinning the lid. This does not mean that these cells are larger than those which have not been extended, but it is the habit of the *Polistes* workers frequently to stop short in their building operations so that it is necessary for the growing larvae to extend the cells with silk in order to have room enough for themselves. But most interesting of all is the fact that often we find some cells of *P. annularis* entirely lined with silk; this is the same kind of material that is woven into the lid but it is very much thinner. This lining is also much more delicate than that which we find in cells of *Vespa maculata*. In the latter species, this silken lining always remains in cells which have been occupied by larvae, and it is very tough; one can grasp it at one end with the forceps and draw out the entire sac intact, so one holds in his hand a veritable silken replica of the cell. In *P. annularis*, this lining is thin and frail; when one attempts to handle it in the same way, it breaks into bits. However, the silken lids and silken additions to the paper cells, are every whit as strong in *P. annularis* as those made by other species.

This silky lining in the cells of *P. annularis* does not appear in all of the cells of each nest, nor is it present at all in some nests. For some unknown reason it is present in more cells of some nests than in others; perhaps some day when a large number of nests from all species of *Polistes* can be examined, we shall be

able to trace the evolution of this silk-spinning habit. May we not hope some day to be able to trace conditions in the genus, from the species where the workers build the cell, lid and all, of paper through to a species where the larvae assist, by spinning the lid; then to a species that only superficially lines the cell and onward to one that thoroughly and heavily lines it; thence to one in which the larvae completely build their own cocoons? Or perhaps I have the order of evolution reversed. Does not the evidence now at hand indicate that in the primitive type the larva does the cocooning, and that in the more highly specialized type we shall find the division of labor so highly specialized that workers will completely construct the nest? After all, the lining of the cell of *Vespa maculata* is nothing other than a cocoon completely made by the larva. May it also be possible that parallel lines of evolution occur in *Polistes* and *Vespa?* While *V. maculata* leaves a large amount of silk lining in each cell, the one nest of *V. germanica* which I have examined showed no vestige of silk-spinning besides the lids spun at the tops of the cells.

The addition of a lining in each cell does much to strengthen the nest, and the hardened masses of excrement plastered to the ceilings of the cells also contribute much to the heaviness and card-board-like nature of the roofs of the nests of *P. annularis* and the combs of *V. maculata.* The securing of strength and warmth is not, however, the sole purpose of the spinning habit, at least not at present and in this climate. We can better understand the non-utility of this habit in so far as the strength of the nest is concerned, when we consider that *V. maculata,* with fold upon fold of paper blankets covering the combs, has the habit of lining the cells thoroughly developed and constant, whereas *P. annularis,* which lives in the tree-tops, with the combs fully exposed to the elements, has the habit only slightly developed and in only a part of the population. In the nests of *V. germanica,* if the one nest which I have examined is representative of the species, it appears not at all, even though this species nests just below the surface of the earth where an excess of moisture is a factor that must frequently be guarded against.

In another interesting way we can compare the habitat habits of certain species of *Polistes* with those of certain species of *Vespa.* May it not be possible that in *Polistes* we have evolution convergent with that of *Vespa?* The British *Vespa,* according to Sharp, (Insects, II. p. 81,) number only eight species (only seven enumerated) all belonging to the genus *Vespa,* and yet they exhibit three different modes of nidification: *V. vulgaris, V. germanica* and *V. rufa* form subterranean nests, while *V. arborea, V. sylvestris* and *V. norvegica* suspend their habitations from branches of trees, and *V. crabro* usually adopts an intermediate course, forming its nest above ground but in a spot where it is protected and concealed; its favorite habitat is the interior of an old tree, but this hornet will sometimes avail itself of the protection of a thatched roof. It deserves more than passing notice that analogous conditions hold for the three species of *Polistes,* and an intermediate one for a fourth species.* *P. rubiginosis* can be compared with *V. crabro,* since both build in completely concealed places, such as hollow trees and spaces between two walls. The ground species of *Vespa* represented in this region by *V. germanica,* has almost a counterpart in *P. variatus* which often builds close

*—See article in Ecology, Vol. x, p. 191, 1929.

to the ground and sometimes under stones on the ground, although, too a nest is occasionally found in such sheltered places as buildings. The tree-inhabiting species mentioned above, which should include *V. maculata,* likewise are represented here by *P. annularis,* which always is arboreal.

TETRASTICHUS VERRUCARII, NEW SPECIES, A CHALCID PARASITE OF *NEUROTERUS* (CYNIPIDAE) ON BUR OAK.

BY W. V. BALDUF*,
University of Illinois.

Tetrastichus verrucarii n. sp.

According to Mr. A. B. Gahan this species is "close to (*Hyperteles*) *Tetrastichus neuroteri* Ashm., but the types of that species have two erect bristles on the submarginal vein, the hind tibiae mostly black, and the funicle joints not much longer than broad."

Female: Length 1.0-1.6 mm., average 1.4 mm., moderately robust; body black, faintly to strongly tinged with green or blue, shining, mandibles brown; antennae light brown with dorsal surface of scape and pedicel darker; eyes and ocelli deep pink to red; thorax bluish or greenish black above, hints of brown on pleura; trochanters pale to darker, about basal three-fourths of femora, and tarsal claws, black; legs otherwise creamy white; abdomen varying, entirely like dorsum of thorax, or with basal two or three segments more or less creamy white above and below, sides usually dark; antennae moderately covered with fine hairs, and arising on line with ventral edge of eyes, flagellum with elongate sensoria varying in number on the different segments, nine-segmented including one ring-joint, scape subspindle-shaped and not quite as long as pedicel and first two funicle joints combined; pedicel subconical, its maximum width about half its length, three funicular segments subequal, each about twice as long as broad; club distinct and three-segmented, first two segments equal in length, second widest, terminal joint pointed and less than half as long as the preceding joint; antennal scrobe large, broad, narrowing below; vertex finely shagreened; head sparsely hairy; head viewed dorsally twice wider than long, broadly rounded anteriorly (eyes and other parts of head often collapsed on dry specimens); thorax suboval in outline dorsally, higher and slightly broader than head, wider and shorter than abdomen; pronotum short, rounded, and about five times as wide as long, finely shagreened; notauli complete; prescutum with faint median impressed line from base to apex; two parallel furrows dividing scutel longitudinally, the median area thus formed slightly larger than the lateral areas; mesospleura and prescutum minutely coriaceous; mesal carina of propodeum present on anterior third only, dividing thereafter and continuing laterad along curved hind margin of each half of propodeum twice wider than long, anterior edge almost straight, the caudo-mesal quarter of each finely coriaceous and sunken below antero-lateral subtriangular part, latter bearing the elongate oval spiracle; outer face rounded and almost smooth; thorax mostly sparsely hairy, coxae subconical, stout; tibiae straight and slightly longer than heavier femora; spur of strigilis light and shorter than first tarsal segment; tarsal joints four, fourth longest, rest subequal;

*—Contribution No. 128 from the Entomological Laboratories of the University of Illinois. The writer here expresses thanks to Mr. A. B. Gahan for assistance in the preparation of this description.

apical three fourths of wings finely ciliated, a single prominent seta on basal half of submarginal vein, and 10-14 long hairs on marginal vein, latter longer and much stronger, and thickest at base which ends in a long point; three hamuli on hind wing at apex of marginal vein, basal one crooked, the rest recurved: abdomen ovate, almost as long as head and thorax combined, finely and sparingly wrinkled, apex more hairy than other parts; first four sternites (not counting petiole) produced ventrad keel-like.

Male: Length 1.0-1.5 mm., moderately robust; antennae nine-segmented, more slender and longer than on female, scape strongly sub-spindle-shaped; the four funicular segments subequal; club not distinct, with scattered pit-like sensoria, terminal segment conical, antepenultimate longer than the preceding segment; first five flagellar joints with whorls of hairs arising on basal halves, hairs above longer than those beneath and mostly reaching beyond apex of the following segment; abdomen subcylindrical or subconical, its basal third frequently creamy white above and below; otherwise same as female.

Type Locality.—Urbana, Illinois.

Type.—Female, Cat. No. 40986 U. S. N. M.

Paratypes.—Twenty females and twenty males on card points, and female and male appendages on slides in balsam, in U.S.N.M. Numerous others on card points and in alcohol, also appendages of four females and two males in balsam on slides, in the author's collection.

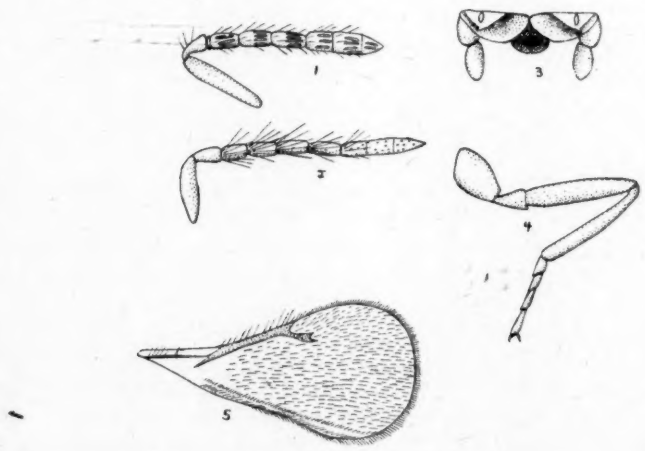


Fig. 1.—Female antenna. Fig. 2.—Male antenna. Fig. 3.—Propodeum of female, with metapleura and coxae, and attachment of abdomen to propodeum. Fig. 4.—Hind leg of female. Fig. 5.—Right front wing, showing the single erect bristle on the submarginal vein.

Known to date only from Urbana, Illinois; reared from May to September in large numbers by the author from the second generation galls (Cynipidae) of *Neuroterus verrucarum* O.S. and the spring generation galls of *N. niger* Gillette, both on the foliage of a single bur oak (*Quercus macrocarpa*). Its larva is an ectoparasite on the larvae of these *Neuroterus* species. For additional information about this parasite, see the preceding paper (Can. Ent. lxi, 125, 1929).

A NEW SPECIES OF SCIARA FROM CANADA (DIPTERA).

BY O. A. JOHANNSEN,
Ithaca, N. Y.

Sciara caesar n. sp.

♂. Head black, shining; ocelli in a flattened triangle behind the eye-bridges and separated from them by a width greater than the diameter of an ocellus; eye-bridges contiguous and three facets wide. Face black, in width extending farther laterad than the middle of the scape. Palpi brownish, first segment short; second broadest, but little longer than wide with distinct sensory spot; third segment not twice as long as broad; fourth more slender, about three times as long as broad. Antennae black, over 2/3 as long as the wing. Thorax subshining black; hairs gray, acrostical hairs short, in an irregular double row extending the length of the scutum; dorso-central hairs but little longer, though more numerous. Scutellum with four longer and several shorter marginal, black, bristly hairs. Abdomen, including hypopygium subopaque black, sparsely covered with fine short gray hairs. Hypopygium with a ventral lobe resembling that of *S. pauciseta,* with about eight setae. The claspers resemble those of *S. sativa* (fig. 120, Bull. 200, Me. Agr. Exp. Station, 1912). Legs brown, more yellowish by transmitted light, coxae lighter, tarsi darker; fore tibiae each with one, middle and hind tibiae, each with a pair of spurs, these about as long as the diameter of the tibia at the tip; hind tibial comb distinct; claws small and simple, empodium well developed. Wings distinctly tinged with grayish; veins dusky, paler at base; branches of M and Cu without setae; sc delicate, short; the distance from the kink in the stem of the radius to the base of the radial sector is about 1½ times as great as the distance from the base of the sector to the tip of R_1; R_1 ends nearly its own length proximad of the fork of M, costa extends nearly ¾ of distance from tip of R_5 to tip of M_{1+2}, this part of the costa greater than the distance between tips of the branches of the media which slightly diverge near the tips, r-m is a little shorter than the base of M, petiole of M and its anterior branch nearly equal in length; petiole of cubitus slightly less than half as long as the base of M; anal veins evanescent. Halteres dark. Length 2 mm.

♀. Resembles the male in coloring. It differs in having shorter antennae, about ½ as long as the wing; in being a little larger, the wing averaging 2½ mm. in length instead of 2 mm, measured from the humeral cross-vein to the tip of the wing; the tip of R_1 is slightly less retracted; r-m is relatively a little longer and the petiole of the cubitus is only slightly over ⅓ as long as the basal section of the media.

This species falls in with *S. pauciseta* in Dr. Pettey's adaptation of my key (Annals Ent. Soc. Amer. 11: 231; Bull. 200, Me. Agr. Exp. Station), but differs in the form of the claspers as noted above and in having in the ♂ a slightly longer petiole of the cubitus than in *pauciseta* and in having the costa in both sexes more produced at the apex. *S. simulans* Joh. which also will fall into the same place in the key differs from *S. caesar* in having a longer petiole of the cubitus and more distinctly and gradually diverging branches of the media, the distance between their tips being greater than the produced extremity of the costa.

The larvae of these insects, associated with those of *Sciara prolifica, Sciara pauciseta* and *Camptocladius byssinus* were very abundant in the soil in a green house in Brampton, Canada, and apparently very injurious to the plants. The species is named after Professor L. Caesar of Guelph to whom I am indebted for the specimen. Holotype and allotype are my collection.

REVISION OF THE SPECIES OF APHODIUS OF THE SUBGENUS DIAPTERNA (COLEOPTERA)*.

BY W. J. BROWN,
Ottawa, Ont.

The following study of *Diapterna* is based upon the available types together with material in the Museum of Comparative Zoology and in the Canadian National and Owen Bryant Collections. The collections of F. S. Carr and J. B. Wallis have also been studied. Most of the characters presented by the species are not well adapted for use in keys, and many of them vary within the species. However, material can be readily and accurately determined without reference to the genitalic characters which, though often feeble, are very constant. It will be noted that the form of the male anterior tibial spur is characteristic in each species. In the descriptions which follow, no mention is made of this spur except a note as to whether or not the apex is turned caudad, a very important feature not shown in the accompanying figures.

The subgenus *Diapterna* Horn (Trans. Am. Ent. Soc., XIV, 3, 1887) may be characterized as follows: frontal suture without trace of tubercles; scutellum large, about one-fourth as long as and in the same plane as the elytra, the median line depressed; elytral disk convex; mesosternum not carinate; middle and hind tibiae fimbriate with unequal spinules. Type, here designated, *Aphodius hamatus* Say. In addition to the above, the North American species agree in the following characters:

Size moderate or large; form moderately elongate, subparallel, strongly convex. Frontal suture evident; clypeus rounded on each side of middle. Genae moderately prominent, broadly rounded, their margins continuous or almost so with those of the clypeus. Pronotum usually with very fine punctures very sparsely placed over the entire disk, with coarse punctures on the sides and usually near base at middle; anterior angles very broadly rounded; sides with a strong marginal line; the side margins arcuate, usually more strongly so in front, the portion before the hind angles oblique; hind angles very obtuse but narrowly rounded; basal margin arcuate. Elytral intervals flat, distinctly alutaceous at the apex; the striae moderately closely, not coarsely punctate. Metasternum and abdomen punctate, more closely so on the sides. *Male.*—Pronotal side margins often more strongly arcuate. Anterior tibial spur spatulate. Minor spur of middle tibia about one-third as long as the major, stout, the sides strongly converging in apical half, the apex twisted and squarely truncate. First segment of hind tarsus with a large recurrent process. *Female.*—Anterior tibial spur normal, moderately stout, scarcely curved, narrowed to apex, the latter acute. Minor spur of middle tibia about two-thirds as long as the major, grad-

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

ually narrowed to apex, the latter simple and acute. First segment of hind tarsus normal.

KEY TO SPECIES

1. Elytra finely alutaceous and not strongly shining; usually yellow and brown, rarely concolorous brown; head feebly convex; basal marginal line of pronotum long, strongly impressed ..... 2.
   Elytra usually strongly shining, uniformly black when alutaceous and dull 3.
2. Smaller (5.7-7.5 mm.); smaller pronotal punctures very fine but usually distinct ..... 1. *hamatus* Say.
   Larger (7-8.5 mm.); pronotum without fine punctures or with a few that are very indistinct ..... 1a. *hamatus garmani* n. subsp.
3. Elytra dark brown, each with apex and a longitudinal stripe pale; basal marginal line of pronotum obsolete ..... 2a. *omissus torpidus* Horn.
   Elytra dark brown or black, concolorous ..... 4.
4. Basal marginal line of pronotum strongly impressed, usually entire; elytra often alutaceous; punctures of middle and hind femora moderately coarse ..... 5. *pinguis* Hald.
   Basal marginal line of pronotum usually obsolete or very short, rarely entire (*hyperboreus*) the elytra then highly polished and without alutaceous sculpture except at apex; middle and hind femora with few coarse and numerous fine punctures ..... 5.
5. Clypeus with apex feebly thickened at middle, without coarse punctures on each side; each elytral interval usually with a fine, feebly impressed but distinct marginal line on each side near the stria; size smaller (5.6-6.5 mm.) ..... 3. *pinguellus* n. sp.
   Clypeus with apex strongly thickened at middle; elytral intervals not distinctly margined; size larger (6.3 mm. or more) ..... 6.
6. Head strongly convex; clypeus often with two or three coarse punctures on each side ..... 2. *omissus* Lec.
   Head almost flat; clypeus without coarse punctures .. 4. *hyperboreus* Lec.

1. **Aphodius hamatus hamatus** Say.

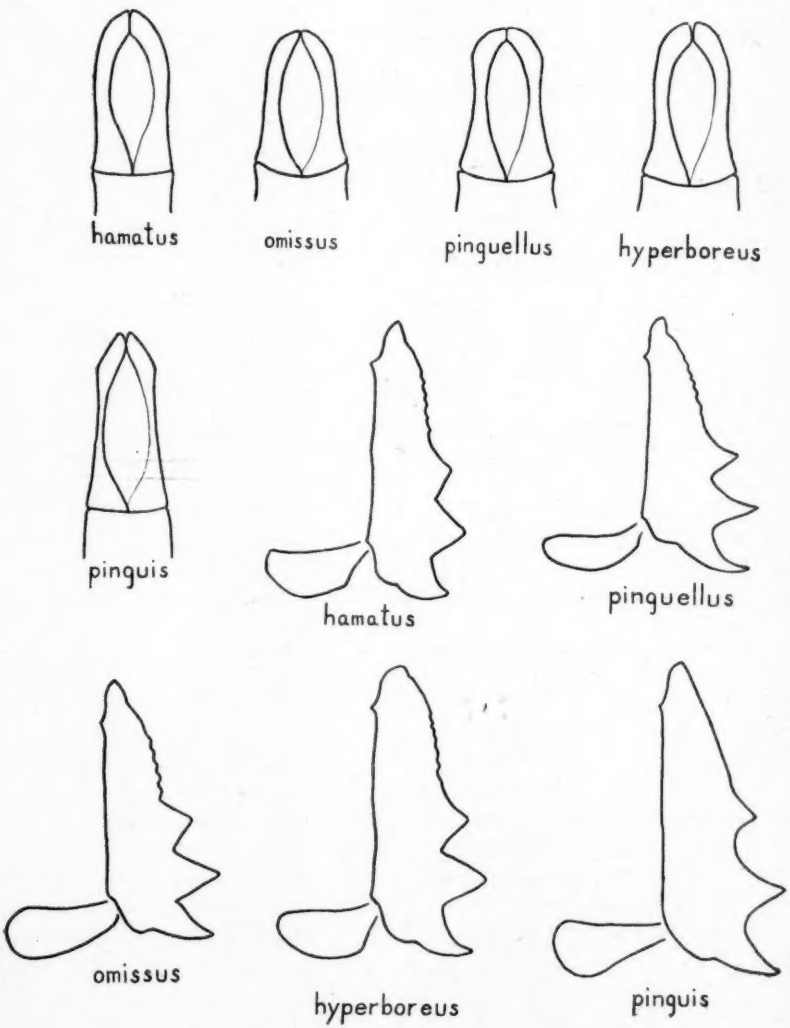
Aphodius hamatus Say, Long's Exped. to St. Peter's Riv., II, 277, 1824; LeConte ed., 1, 183.
Aphodius sagittarius Harold, Ann. Ent. Soc. Fr., VIII, 615, 1860.
Aphodius occidentalis Horn, Trans. Am. Ent. Soc., III, 114, 1870.

Length 5.7-7.5 mm.; width 3.1-3.8 mm. Black; legs and sometimes abdomen very dark brown; elytra never black, usually brown with the second interval, extreme base and apex, and the striae throughout yellow or pale brown, rarely with the brown cloud reduced to a few streaks on several intervals, and very rarely concolorous brown.

Head two-thirds as wide as pronotum; feebly convex; very finely and sparsely, often indistinctly punctulate, without coarse punctures. Clypeal magrin narrowly, strongly, and suddenly reflexed; broadly and very feebly, but distinctly emarginate; clypeal apex strongly thickened at middle.

Pronotum three-fourths as long as wide; the side margins moderately arcuate; the basal margin not sinuate before the hind angles; the basal marginal line strongly, broadly interrupted at middle, usually narrowly separated from the lateral marginal lines but sometimes broadly so and occasionally joining the lat-

CAN. ENT. VOL. LXI. PLATE 9.



APHODIUS SPECIES.

ter; fine punctures of disk usually distinct, the coarse punctures very sparse on the sides, a few scattered over the middle near base.

Elytral intervals distinctly dulled by the very fine allutaceous sculpture; very finely and sparsely, indistinctly punctulate; with or without impressed marginal lines near the striae.

Anterior tibial teeth moderately stout and close. Middle and hind femora sparsely, moderately coarsely punctate. First segment of hind tarsus usually shorter than the three following, sometimes equal to these in the female.

Male.—Side pronotal margins scarcely more strongly arcuate than in the female; coarse punctures of pronotal disk extremely sparse. Apex of tibial spur turned caudad.

Female.—Coarse pronotal punctures very sparse but much more numerous than in the male.

This species has no outstanding characters except those given in the key and those of the male anterior tibiae. It is represented in the collection at hand by sixty-three males and eighty-two females collected during May, June and July at the following localities: Montreal, Que.; Aweme, Onah, Ethelbert, Winnipeg, and Pierson, Man.; Hague and Ogema, Roche Percee, Saskatoon, and Weyburn, Sask.: Banff, Bilby, Calgary, Edmonton Kananaskis, Leduc, Turner and Waterton, Alta.; Ft. St. John, Pouce Coupe, and Victoria, B. C ; and Lassen, Cal.

Say's name is assigned to this species because in *omissus torpidus*, the only other with partly pale elytra, the male anterior tibial spur is not "curved inwards like a hook." The species was described from "Northwest Territory." Harold's *sagittarius*, described from Michigan, is placed here because it is described as having the elytra pale and the pronotum margined at base, a combination of characters not found elsewhere in the group. The specimen labelled lectotype of *occidentalis* in the Horn collection, a male from Oregon, is here designated lectotype of Horn's species.

1a. **Aphodius hamatus garmani** n. subsp.

This subspecies differs from *hamatus* only by the characters given in the key.

Holotype.— ♂, Bridger Basin, Wyoming, (Garman); in the Museum of Comparative Zoology.

Allotype.— ♀, same data.

Paratypes.—23 ♂, 4 ♀, same data; 2 ♂, 1 ♀, Wyoming (Garman); No. 2957 in the Canadian National Collection, Ottawa.

2. **Aphodius omissus omissus** Lec.

Aphodius omissus Lec., Agass. Lake Superior, 225, 1850.
Aphodius concavus Hald. nec Say, Jour. Ac. N. S. Phila., I, 103, 1848.

Length 6.3-7.9 mm.; width 3.4-3.9 mm. Black; legs and sometimes the abdomen dark brown, elytral apex usually obscurely paler.

Head seven-tenths as wide as pronotum; strongly convex; very finely and sparsely punctate, the punctures indistinct at middle, usually with two or three moderately coarse punctures on each side of clypeus. Clypeal margin very narrowly, suddenly, and strongly reflexed; very feebly but distinctly emarginate at middle, very broadly rounded on each side of the emargination; the apex rather strongly thickened at middle.

Pronotum about three-fourths as long as wide; the side margins moderately arcuate; the basal margin distinctly sinuate just before the hind angles, the latter therefore prominent; basal marginal line absent or feeble and very short, being represented by a few punctures joined together; fine punctures of disk sometimes indistinct; coarse punctures sparse, a few scattered over basal half of disk at middle.

Elytral intervals without trace of alutaceous sculpture, very strongly shining; very finely and sparsely, often indistinctly punctulate; at most with only very feeble traces of marginal lines near the striae.

Anterior tibial teeth moderately stout and close. Middle and hind femora very finely and sparsely punctulate, each with a few coarse punctures. First segment of hind tarsus slightly shorter than the three following.

Male.—Side margins of pronotum slightly more strongly arcuate than in the female. Apex of anterior tibial spur not turned caudad.

Female.—Pronotal sides with sparse coarse punctures, these slightly more numerous than in the male.

In this species, the head is more convex than in any other, and the head and pronotum are a bit wider than usual. Its closest ally is *pinguellus*.

The collection at hand includes nineteen males and nine females collected during May, June and July at the following localities: Aweme, Douglas, Husavick, Glen Souris, Victoria Beach, and Winnipeg, Man.; Bilby, Lethbridge, Olds, and Whitford Lake, Alta.; Coeur d'Alene, Id.; Trinity Valley, B. C. The species was described from Lake Superior, and the specimen bearing the name label in the LeConte collection, a male, is here designated the lectotype.

2a. **Aphodius omissus torpidus** Horn.

Aphodius torpidus Horn, Trans. Am. Ent. Soc., III, 114, 1870.

This seems to be a color form of *omissus*, differing from the latter only in the color of the elytra which are as follows: dark brown or black, each with a longitudinal yellow stripe; the stripe including the second interval and the extreme base of the third, widening at apex to make the latter broadly pale, rarely including in addition all of the third and base of the fourth interval. All the specimens in the collections at hand can be definitely referred to either typical *omissus* or *torpidus;* apparently intermediates do not occur. The collections include eighteen males and fifteen females of *torpidus* collected between April 26 and July 16 at the following localities: Aweme, Victoria Beach, and Winnipeg, Man.; Ogema and Rosthern, Sask.; Edmonton, Medicine Hat, Tofield and Waterton, Alta.; Midday Creek, B.C.; Coeur d'Alene, Id.

Horn described *torpidus* from "Salt Lake, Fort Simpson, and Oregon." The types are no longer in his collection, but a female specimen labelled *torpidus* in Horn's hand and with the locality label, "Sl. L.," is included in the LeConte collection; this is undoubtedly a cotype and is here designated lectotype of the species.

3. **Aphodius pingellus** n. sp.

Length 5.6-6.5 mm.; width 2.8-3.4 mm. Black; venter, legs, and sometimes the elytra very dark brown; elytra concolorous; strongly shining.

Head slightly more than two-thirds as wide as pronotum; moderately convex; finely and sparsely punctate, indistinctly so at middle. Clypeus broadly, not

deeply emarginate, very broadly rounded on each side of the emargination; clypeal apex not reflexed, feebly thickened at middle.

Pronotum almost four-fifths as long as wide; side margins not strongly arcuate; basal margin with a row of punctures on each side of middle but without trace of a marginal line, the margin distinctly sinuate just before the hind angles, the latter therefore prominent; fine punctures of disk sometimes indistinct, the coarse punctures sparsely scattered over basal half of disk in both sexes.

Elytral intervals sometimes with indistinct traces of alutaceous sculpture, strongly shining, sparsely and very finely but usually distinctly punctulate; each with a fine, impressed marginal line on each side near the striae, this not strong but usually very distinct.

Anterior tibial teeth slender and well separated. Middle and hind femora finely and sparsely punctulate. First segment of hind tarsus slightly shorter than the three following.

Male.—Side margins of pronotum sometimes slightly more strongly arcuate than in the female; coarse punctures of the pronotal sides sparse. Extreme apex of anterior tibial spur just visibly bent caudad.

Female.—Coarse punctures of pronotal sides moderately close.

Holotype.— ♂, High River, Alta., June 25, 1927, (O. Bryant); No. 2956 in the Canadian National Collection, Ottawa.

Allotype.— ♀, same data.

Paratypes.—9 ♂, 6 ♀, same data as holotype; 1 ♂, 1 ♀, Kananaskis, Alta., June 15, 1927, (O. Bryant); 1 ♂, Cowley, Alta., June 27, 1918, (R. N. Chrystal); 1 ♀, Husavick, Man., June 23, 1912, (N. Criddle); 1 ♂, 2 ♀, Ethelbert, Man., June 24, 1926, (J. B. Wallis); 1 ♂, Thornhill, Man., July 1, 1916, (J. B. Wallis); 1 ♂, Winnipeg, Man., June 30, 1924, (J. B. Wallis); 1 ♂, Stony Mt., Man., July 31, 1916, (J. B. Wallis); 1 ♂, Miami, Man., July 2, 1914, (J. B. Wallis); 1 ♂, Shuswap Reservation, B. C., August 2, 1926, (F. S. Carr); 2 ♂, 1 ♀, Buena Vista, Col. July 1-6, 1896, (H. F. Wickham).

This is our smallest species. It is closely allied to *omissus* but may be distinguished from the latter by its less convex head and male characters, as well as by the characters given in the key. Paratypes are deposited in the Museum of Comparative Zoology.

4. Aphodius hyperboreus Lec.

Aphodius hyperboreus Lec., Agass. Lake Superior, 225, 1850.
Aphodius angularis Lec., Agass. Lake Superior, 225, 1850.

Length 7.1-8 mm.; width 3.7-4.5 mm. Black, sometimes the venter and legs, rarely the elytra, dark reddish-brown; elytra concolorous; very strongly shining.

Head about three-fifths as wide as pronotum, almost flat; very finely and sparsely, often indistinctly punctate, without coarse punctures, an area on the vertex impunctate. Clypeal margin suddenly and strongly reflexed; broadly and feebly but distinctly emarginate at middle; clypeal apex strongly thickened at middle.

Basal margin of pronotum distinctly sinuate just before the hind angles, the latter therefore prominent; basal marginal line strongly impressed, broadly interrupted at middle, usually broadly separated from the lateral marginal line but

sometimes joining the latter; fine punctures of pronotal disk very sparse, usually indistinct.

Elytral intervals polished, rarely with very indistinct alutaceous sculpture; virtually impunctate, the few very fine punctures scarcely visible; only rarely with traces of marginal lines near the striae.

Anterior tibial teeth stout and close. Middle and hind femora very finely and sparsely punctate, with a few coarse punctures.

Male.—Clypeus rather broadly reflexed at middle. Pronotum slightly more than three-fourths as long as wide; with the side margins strongly arcuate; the disc with widely separated coarse punctures on the sides and at base. Apex of anterior tibial spur turned caudad. First segment of hind tarsus equal to the two and one-half segments following.

Female.—Clypeus less broadly reflexed at middle. Pronotum more than four-fifths as long as wide; with the side margins moderately arcuate; the coarse punctures of the disk sparse but much more numerous than in the male. First segment of hind tarsus equal in length to the three following.

This species may be separated from *omissus* and *pinguellus* by its large size, flat head, and the impressed basal marginal line of the pronotum. Its nearest ally is *pinguis* from which it differs by the finely punctate femora and the male characters.

The species is represented in the collection at hand by sixteen males and eight females collected during May, July, and August at the following places: Covey Hill, Ft. Coulonge, and Gaspe, Que.; Rainy River District, Ont.; Chicago, Ill.; Aweme, Ethelbert, Husavick, Winnipeg, and Winnipegosis, Man.; Bilby, Edmonton, and Olds, Alta.; and Vancouver, B. C. The species was described from Lake Superior and the specimen bearing the name label in the LeConte Collection is here designated the lectotype. The specimen labelled *angularis* in the LeConte collection, here designated lectotype, is a small female with a long basal marginal line on the pronotum.

5. **Aphodius pinguis** Hald.

Aphodius pinguis Hald., Jour. Ac. N. S. Phila., I, 103, 1848.
Aphodius validus Horn, Trans. Am. Ent. Soc., III, 112, 1870.

Length 6.9-8 mm.; width 3.7-4 mm. Back, venter and legs sometimes dark brown; elytra concolorous; shining.

Head very feebly convex, very distinctly punctate; clypeus with anterior margin rather broadly, not suddenly reflexed, the apex strongly thickened at middle.

Pronotum with the sides strongly arcuate; basal margin not distinctly sinuate before the hind angles; the basal marginal line strong, sometimes entire and joining the side marginal lines, sometimes narrowly interrupted at middle and then narrowly separated from the side marginal lines; pronotal disk sparsely punctate, the punctures coarse and very fine intermixed.

Elytral intervals sometimes feebly alutaceous and slighly dull, sometimes polished and with only faint traces of alutaceous sculpture; very finely and sparsely, rather indistinctly punctulate; never with traces of a marginal line on each side near the striae.

Anterior tibial teeth moderately slender, well separated; the tibial margin

not crenate above the upper tooth. Middle and hind femora with numerous moderately coarse punctates, these becoming moderately close near the hind margins. First segment of hind tarsus longer than the three following in both sexes.

Male.—Head finely, moderately closely punctate near apex, the punctures becoming sparse and slightly finer posteriorly; clypeal margin at middle subtruncate, not emarginate. Pronotum larger, almost twice as wide as the head and slightly more than four-fifths as long as wide; the side margins very strongly arcuate, especially anteriorly; the sides with a few coarse punctures. Apex of anterior tibial spur not turned caudad. Hind tibia stouter. First hind tarsal segment very large, as long as the three and one-half following segments.

Female.—Head punctate as in the male and with a few coarse punctures on each side of clypeus; clypeal margin at middle very feebly but usually distinctly emarginate. Pronotum smaller, the head equal to two-thirds its widths, three-fourths as long as wide; the side margins distinctly less strongly arcuate; the sides sparsely punctate but with the coarse punctures much more numerous than in the male. First segment of hind tarsus slightly longer than the three following.

In this species, the sexual characters of the male are developed to a greater degree than in any of its allies; of these, the almost semicircular head, the very strongly arcuate side margins of the pronotum, and the very large first segment of the posterior tarsus are especially notable. In the female, the side pronotal margins are more strongly arcuate, and the hind tarsi are stouter than in the females of the other species. In no other species is the margin of the anterior tibia entire above the upper tooth.

The collection at hand includes eleven males and eleven females of this species collected at the following localities: Mt. Washington, N. H.; Kazubazua and Montreal, Que.; Aweme and Stonewall, Man.; Roche Percee and Saskatoon, Sask.; and Lethbridge, Alta. The species was described from Lake Superior, and the specimen bearing the name label in the LeConte collection is here designated the lectotype. This specimen agrees almost perfectly with the types of *validus* Horn which was described from Abitibi House, Hudson Bay Region. The specimen labeled "type" of *validus* in the Horn collection is here designated the lectotype of Horn's species. Judging from published descriptions, it seems probable that Horn applied the name *pinguis* to the species described in this paper as *hyperboreus* Lec.

A LIST OF THE CRANE-FLIES OF QUEBEC (DIPTERA.) I*

BY CHARLES P. ALEXANDER,
Amherst, Massachusetts.

The basic list of the Tipulidae of Quebec is that of Winn and Beaulieu[1], in which a total of two Ptychopteridae, two Trichoceridae and eighty-seven Tipulidae are recorded from the Province. Certain of the records in this list are erroneous, a few others are synonyms, while still additional species are placed in incorrect genera. In the present preliminary list, I have endeavoured to

*—Contribution from the Entomological Laboratory, Massachusetts Agricultural College.

1.—Winn, Albert, and Beaulieu, Germain. A preliminary list of the insects of the province of Quebec. Part II. Diptera. 7th Rept. Quebec Society for the Protection of Plants, Suppl., 108-159; 1915.

collect and correct the various published records and to add the data that have become available as a result of the identification of collections in recent years. The two largest sources of the latter are the series of Tipulidae taken in the Gaspé Peninsula by Dr. G. C. Crampton (south shore, Matapédia to Gaspé, June 26-July 1, 1928; north shore, Gaspé to Métis-sur-mer, July 1-5, 1928) and the extensive collections of the Canadian National Museum, kindly submitted for identification by Dr. James McDunnough and Mr. C. Howard Curran.

Collectors of material or authorities for records are indicated by their initials, as follows:

AA=A. Arcaud
ADB=A. D. Baker
GB=Germain Beaulieu
JIB=J. I. Beaulne
GC=George Chagnon
GCC=G. Chester Crampton
CHC=C. Howard Curran
RNC=R. N. Chrystal
TWF=T. W. Fyles
AG=Arthur Gibson
GHH=G. H. Hammond
CBH=C. B. Hutchings
FPI=F. P. Ide
HFL=H. F. Lewis
JM=J. McDunnough
RO=R. Ozburn
CEP=C. E. Petch
WAR=W. A. Ross
WSR=W. S. Ryan
OS=C. R. Osten Sacken
GSW=G. S. Walley
AFW=A. F. Winn
FWW=F. W. Waugh
VDW=F. Van der Wulp

TANYDERIDAE

Protoplasa fitchii (O.S.) River Pabos, south shore of Gaspé, June 26-July 1, 28 (GCC). The very unusual occurrence of this rare fly has been discussed by Crampton (Can. Ent., 61:70; 1929).

PTYCHOPTERIDAE

Ptychoptera rufocincta O.S. Montreal (GB); Rigaud, June 26, 06 (GB).

Bittacomorpha clavipes (Fabr.) Montreal (GB); St. Hilaire, July; Levis, July (TWF); Cap a l'Aigle, July (AFW).

TRICHOCERIDAE

Trichocera maculipennis (Fabr.) Montreal, Aug. (GB); Johnson det.

Trichocera regelationis (Linn.) Montreal, Sept. (GB); Johnson det.

TIPULIDAE

SUB-FAMILY TIPULINAE

(*Tanyptera atrata* Linn. Identity entirely problematical) Quebec (vdW); St. Rose, July (GB).

Tanyptera fumipennis (O.S.) Bergerville (TWF); Montreal, June (GB).

(*Tanyptera dorsalis* Walk. Identity problematical). St. Johns Co., Aug. (GC).

Tanyptera frontalis (O.S.). Wakefield, June 14, 26 (FPI).

Tanyptera topazina (O.S.). Montreal, (GC); Wakefield, June 14, 26 (FPI).

Ctenophora apicata O.S. Montreal, June (GB & GC).

Prionocera fuscipennis (Lw.) (includes also *Tipula illustris* Doane of the W. B. List). Montreal, July 5, 02 (GB); Rigaud, June (GC).

Tipula abdominalis (Say). Gatineau, July (GB); Hull, June (JIB); Lac Masson, July 15, 09 (AA).

Tipula angulata Lw. Aylmer, June (JIB); Montreal, June (GB); Hemmingford, June 2, 23 (ADB); Rouville.

Tipula angustipennis Lw. Montreal, June (GC); Rigaud, June (GB); Chelsea, May, June (TWF); Hull, June (JIB); Lachine, June 11, 26 (FPI); Aylmer, May 23-24, 19 (CBH); Hemmingford, May 27, 25 (GHH), June 2, 23 (ADB).

Tipula apicalis Lw. Chelsea, July 2, 12 (AG).

Tipula bella Lw. Montreal, (GC); St. Johns Co., July, Aug., (GC); Rougemont, Aug. 12, 25 (GHH); Kirks Ferry, Aug. 22, 24 (FPI); Aylmer, June 3, 24 (CHC).

Tipula bicornis Forbes. Montreal, June (GB); Rigaud, June (GB); Newaygo, June (AFW); Sherbrooke, July 2, 16; Megantic, July 6, 16.

Tipula caloptera Lw. Wakefield, July 27, 26 (FPI).

Tipula cincticornis Doane (includes *mingwe* Alex.). Montreal, Aug. (GB); Aylmer, Aug. 14, 19 (CBH); Kingsmere, July 23, 19 (RNC).

Tipula collaris Say (as *Pachyrhina* in the W. B. List). Montreal, June (GB).

Tipula cunctans Say. Aylmer, Sept. 21-28, 24 (CHC).

Tipula decora Doane. Montreal (GC).

Tipula dejecta Walk. Montreal, Aug. (GB), a doubtful record; Broadview May 15, 25 (GSW); May 27, 25 (FPI); Hemmingford, May 26, 25 (GHH); Chelsea, May 30, 23 (RO); Aylmer, May 25, 24, May 10, 25 (CHC); Hull, May 23, 25 (CHC).

Tipula eluta Lw. Gatineau, July (GB); Aylmer, June (JIB); Hull, July 28, 20 (JM); Gaspé, north shore, July 1-5, 28 (GCC).

Tipula fragilis Lw. Aylmer, Sept. 28, 24 (CHC).

Tipula gaspensis sp. n.

Belongs to the *hebes* group; size unusually small (wing, under 12 mm.); antennae (♂) of moderate length, approximately equal to the combined head and thorax; flagellum dark brown; wings with the dark pattern much reduced; male hypopygium with the eighth sternite broad, its caudal margin not conspicuously emarginate, the surface with erect yellow setae.

Male.—Length, about 9-10 mm.; wing, 10.5-11.5 mm.; antennae, about 4-4.5 mm.

Female.—Length, about 13-13.5 mm.; wing, 11.5 mm.

Described from alcoholic specimens.

Frontal prolongation of head yellow, the nasus conspicuous, dark brown; palpi chiefly pale, the basal three segments ringed with brown. Antennae (male) of moderate length, if bent backward extending about to the base of the abdomen; scape yellow, the flagellum brownish black, the basal enlargements of the segments a little darker than the remainder. Head brownish gray, the frons and lower surface more yellowish.

Pronotum yellow, variegated with dark brown. Mesonotal praescutum pale with confluent dark stripes, the scutal lobes extensively darkened; scutellum pale, the median segment with a narrow dusky median line; postnotum pale, variegated with brown. Pleura pale, with longitudinal dark brown stripes on the

propleura, anepisternum and ventral sternopleurite. Halteres pale, the base of the knobs darker. Legs with the coxae and trochanters pale; femora yellow, the tips narrowly dark brown; tibiae obscure yellow, the tips passing into brown; tarsi brownish black. Wings with the dark pattern very reduced, the ground-color suffused and only vaguely variegated with paler, including ante- and post-stigmal spots, obliterative areas along the cord, a spot before the outer end of cell *M*, adjoining vein *Cu* and a similar area at near one-third the length of cell *Cu;* stigma dark brown.

Abdomen obscure yellow, both sternites and tergites with a narrow brownish black median stripe, the lateral tergal stripe indicated only on the subterminal segments; outer segments and most of hypopygium black. In the female, the abdominal tergites beyond the second are distinctly trivittate; subgenital segment and sternal valves of ovipositor blackened. Male hypopygium with the eighth sternite broad, the caudal margin truncate to slightly convex; surface laterally with conspicuous grooves that converge anteriorly, these fringed with erect yellow setae; each caudo-lateral angle of sternite with a small yellowish lobule. Lateral appendage with three processes, the lower one very long and slender, pale, pendulous; middle process blackened, claw-like; dorsal process expanded, the margin obtuse and blackened.

Habitat.—Quebec (Gaspé).

Holotype, male, south shore, June 26—July 1, 1928 (G. C. Crampton).

Allotopotype, female.

Paratopotypes, several of both sexes; 1 ♂, north shore, July 1-5, 1928 (G. C. Crampton). Types in author's collection.

By Dietz's key to the species of the *hebes* group (Trans. American Ent. Soc., 40: 346-347; 1914), the present species runs to couplet 14, disagreeing with both included species in the small size, length of the antennae, and in genitalic characters.

Tipula grata Lw. Aylmer, June, July (JIB).

Tipula hebes Lw. Montreal, June (GB); Ottawa Golf Club, Aug. 14, 24 (FPI); Rigaud, June (GB); Hull, June (JIB); Hemmingford, Aug. 14, 25 (GHH); Aylmer, June 27, 24 (CHC).

Tipula hermannia Alex. Wakefield, July 27, 26 (FPI); Covey Hill, June 23, 24 (GSW); Megantic, July 6, 16.

Tipula hinei Alex. Gaspé, north shore, July 1-5, 28 (GCC).

Tipula inermis Doane (see also *T. umbrosa*). Montreal, June (GC); Gatineau, July (GB).

Tipula iroquois Alex. (*cincta* Lw., of the W. B. List). Levis (TWF).

Tipula labradorica Alex. Abitibi region, northern Quebec, July 16 (Dr. Cook); Piashte Bai, June 16, 21 (HFL).

Tipula latipennis Lw. (*ottawaensis* Dietz, of the W. B. List). Aylmer, (JIB); Hemmingford, July 2-Aug. 2, 25 (GHH); Gaspé, north shore, July 1-5, 28 (GCC).

Tipula megaura Doane. Aylmer, June (JIB).

Tipula monticola Alex. Aylmer, June 13, 26 (CHC); Cascade, June 12, 23 (RO).

Tipula nobilis Lw. Gaspé, south shore, June 26-July 1, 28 (GCC).

Tipula parshleyi Alex. Aylmer, June 3, 25 (CBH); Gaspé, north shore, July 1-5, 28 (GCC).

Tipula penobscot Alex. Gaspé, both shores, June 26-July 5, 28 (GCC).

(*Tipula retorta* Wulp. Recorded from the Province of Quebec by van der Wulp; identity problematical).

Tipula sayi Alex. (*costalis* Say, of the W. B. List). Montreal (GC); Gatineau, July (GB); Hull, July (GB), July 28, 20 (JM); Rougemont, Aug. 12, 25 (GHH); Kirk's Ferry, Aug. 5, 25 (GSW).

Tipula senega Alex. (*pallida* Lw., of the W. B. List). Newaygo, June (AFW); Wakefield, June 14, 26 (FPI); Megantic, June 20, 23 (CHC); Sherbrooke, July 2, 16.

Tipula serta Lw. Montreal (GC); Rouville Co., (GC); Rigaud, June (GB); Aylmer, May 26, 19-June 5, 20 (CBH); Chelsea, June 17, 16 (AG); Bradore, July 15, 21 (HFL).

Tipula sulphurea Doane. Montreal, July (GB), May 26, 01 (GC); Gaspé, north shore, July 1-5, 28 (GCC).

Tipula tephrocephala Lw. Aylmer, June (JIB); Hull, May 21, 04; Gaspé, south shore, June 26-July 1, 28 (GCC).

Tipula trivittata Say. Quebec (TWF); Montreal, June (GB); Ste. Anne, June 24, 25 (FPI); Gatineau, July (GB); Lachine, June 11, 26 (FPI); Aylmer, June 12, 22 (CBH), June 22, 24 (CHC).

Tipula ultima Alex. (*flavicans* Fabr., of the W. B. List). Montreal, Sept. (GC); St. Johns Co., Sept. (GB); Hull, Sept. 25, 23 (CHC); Aylmer, Sept. 18, 23 (CBH); Jordan, Sept. 16, 14 (WAR).

Tipula umbrosa Lw. (probably includes *inermis* Doane of the W. B. List). Kingsmere, Aug. 3, 19 (RNC); Kirk's Ferry, Aug. 22, 24 (FPI); Abitibi Region, northern Quebec, July 1916 (Dr. Cook).

Tipula unimaculata (Lw.) Fort Coulonge, Aug. 20, 17 (JIB).

Tipula valida Lw. (includes also *calva* Doane of the W. B. List). Rigaud, June (GB); Hull, June 20, 03; Aylmer, June (JIB), June 15, 25 (CHC).

(*Tipula vitrea* Wulp. Recorded from the Province of Quebec by van der Wulp; identity problematical).

Tipula youngi Alex. (*macrolabis* Lw., of the W. B List). Aylmer, June (JIB); Seven Islands, Aug. 9, 24 (FWW).

Nephrotoma eucera (Lw.) Montreal, June (GB); Hull, June, (JIB); Laurentian Mts., June (JIB).

Nephrotoma ferruginea (Fabr.) Quebec, July (TWF); Montreal, Aug. (GC); Gatineau, July (GB); Hull, July (JIB); Rougemont, Aug. 12, 25 (GHH); Hemmingford, July 29, 23 (CEP); Gaspé, north shore, July 1-5, 28 (GCC).

Nephrotoma incurva (Lw.) Montreal, June (GB); Aylmer, June, July (JIB); Hull, June 10, 23 (CHC).

(*Nephrotoma lineata* (Scopoli). All American records erroneous).

Nephrotoma lugens (Lw.) Quebec (TWF); Montreal, June (AFW), July

5, 26 (WSR); Hemmingford, July 2, 25 (GHH); Covey Hill, June 28, 24 (GSW); Stoke Center, June 26, 12; Gaspé, south shore, June 26-July 1, 28 (GCC).

Nephrotoma macrocera (Say). Ft. Coulonge, July 9, 17 (JIB).

Nephrotoma occipitalis (Lw.) Coaticook, Sept. (JIB).

Nephrotoma sodalis (Lw.) Montreal, Aug. (GB); Hull, July (JIB).

Nephrotoma tenuis (Lw.) St. Johns Co., Aug. (GC); Chambly Co., (GB).

Nephrotoma xanthostigma (Lw.) Montreal, Aug. (GB).

Dolichopeza americana Ndm. Gaspé, north shore, July 1-5, 28 (GCC).

Oropeza albipes Johns. Montreal, June (GB).

Oropeza obscura Johns. Rigaud, June (GB).

Oropeza venosa Johns. Gaspé, north shore, July 1-5, 28 (GCC).

Subfamily CYLINDROTOMINAE

Liogma nodicornis (O.S.) Montreal, June (GC) St. Johns Co., June, July 20, 01 (GB); Stoke Center, June (AFW); Megantic, July 6, 16; Meach Lake, June 21, 16; Gaspé, both shores, June 26-July 5, 28 (GCC).

Phalacrocera neoxena Alex. Hemmingford, June 27, 23 (ADB).

Subfamily LIMONIINAE

Limoniini

Limonia (*Limonia*) *cinctipes* (Say). Montreal, May (GB); Hemmingford, July 30, 25 (GHH); Aylmer, Aug. 10, 24 (CHC); Gaspé, north shore, July 1-5, 28 (GCC).

Limonia (*Limonia*) *hudsonica* (O.S.) Gaspé, north shore, July 1-5, 28 (GCC).

Limonia (*Limonia*) *indigena* (O.S.) Sherbrooke Co., May, June (GB); Vaudreuil Co., Apr. 30, 02 (GB).

Limonia (*Limonia*) *solitaria* (O.S.) Ottawa Golf Club, Aug. 14, 24 (GSW); St. Hilaire, July (GC); Gatineau, July (GB); Hull, July (JIB); Rouville; Kirk's Ferry, Aug. 5, 25 (GSW), Aug. 22, 24 (FPI); Aylmer, Aug. 28, 24 (FPI); Gaspé, north shore, July 1-5, 28 (GCC).

Limonia (*Limonia*) *tristigma* (O.S.) Kirk's Ferry, Aug. 5, 25 (GSW).

Limonia (*Dicranomyia*) *brevivena* (O.S.) Aylmer, Sept. 21, 24 (CHC).

(*Limonia* (*Dicranomyia*) *distans* O.S. of the W. B. List erroneous).

Limonia (*Dicranomyia*) *immodesta* (O.S.) Montreal, Sept. (GB); Rigaud, June (GB); Sherbrooke, July 2, 16; Megantic, July 6-7, 16.

Limonia (*Dicranomyia*) *gladiator* (O.S.) Aylmer, Sept. 14, 24 (CHC).

Limonia (*Dicranomyia*) *humidicola* (O.S.) (*badia* of authors, *nec* Walk.) Gaspé, both shores, June 26-July 5, 28 (GCC).

Limonia (*Dicranomyia*) *longipennis* (Schumm.) Province of Quebec (O.S.).

Limonia (*Dicranomyia*) *liberta* (O.S.) Montreal, June (GC); Rigaud, June

A NEW CALLIPTERINE FROM VICTORIA, B.C. (HEMIPTERA-APHIDIDAE).

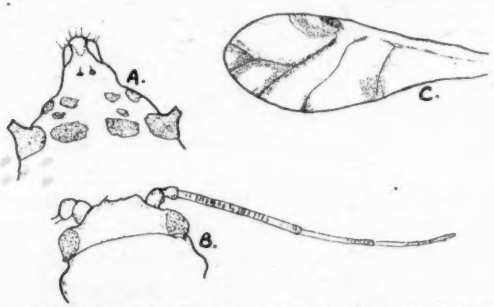
BY R. GLENDENNING,
Dominion Entomological Laboratory, Agassiz, B. C.

Myzocallis pulchellus n. sp.

This beautiful little aphid was collected in 1927, by Messrs. J. Stanley and H. Hulbert, and further material was also received from Mr. W. Downes from an American elm growing in the grounds of the Empress Hotel, Victoria, B. C.

Specimens were referred to Dr. W. M. Davidson and to Mr. A. A. Granovsky both of whom have been unable to identify the species and were of the opinion that it was undescribed.

The generic affinities of this species were for some time uncertain to me, and while agreeing with Dr. A. C. Baker's description of *Therioaphis* Walker, it is not considered genotypic with *T. ononidis* (Kalt.) or *T. tiliae* (L.) by Dr. Davidson. Since it probably has more affinities with the genus *Myzocallis* Pass., I am, therefore, placing it in this latter genus though the dorsal abdominal tubercles would correlate it with *Tuberculatus* Mord., if that genus were recognized.



A.—Part of abdomen showing cornicles, cauda, and anal plate. B.—Head and antenna. C.—Fore-wing showing venation and markings.

Alate female.—Length 2.4 mm. Dorsal aspect of head dusky, pale beneath. Thorax dusky, lobes darker; prosternum pale; mesosternum black. Width of head across eyes .5 mm.; beak scarcely reaching second coxae. Abdomen greenish-yellow dorsally, with four black areas on each margin anterior to the cornicles, and with more or less irregular rectangular black bands on segments 3, 4, 5 and 6; segments 1 and 2 each bear two prominent black-tipped tubercles; several smaller black areas on segments 7 and 8; ventral side of abdomen pale; cornicles black, as broad at base as long, truncate and without evident constriction, with one seta on ventral side midway between the base and apex; cauda dusky, bluntly knobbed and with several setae, equal in length to the deeply bifid dusky anal plate.

Antennae shorter than the body; segments I and II equal, dusky with darker extremities; III, IV, V and VI pale with a proportional amount of duskiness at the distal end of each segment; III with 18 to 25 narrowly oval sensoria on the basal 5/6th; IV and V without secondary sensoria; V with one naked primary sensorium, and VI with the usual oval fringed primary sensorium; unguis rather less than one half as long as the base; proportional lengths of the segments of the antennae, I-6, II-6, III-70, IV-40, V-30, VI-12+5.

Legs with coxa and trochanter black; femur dusky except at base; tibia pale, dusky at base and apex; tarsi dusky; hind legs strongly developed, the femora especially being much thickened.

Front wing with radial sector entirely absent; stigma with dark cloudy area having a clear circular patch in the centre; medial vein twice branched with dusky border throughout; cubitus sinuous, slightly bordered and with cloudy area at the apex; anal vein irregularly bordered and with large rectangular cloudy area at the distal extremity. Hind wing with both media and cubitus present and well marked.

Pupae pale lemon-yellow in colour, with truncated spatulate setae on black-tipped tubercles.

Described from a series of cotypes collected May 20, 1928, by W. Downes, now in the Canadian National Collection, Ottawa, and that of the Agassiz laboratory.

LARDER BEETLE INFESTATIONS ARISING FROM TENT CATERPILLARS.

BY E. H. STRICKLAND,
University of Alberta.

In a recent article Spencer[1] records the Dermestid *A. scrophulariae* L. breeding in houses upon the dead bodies of the Cluster fly *P. rudis* Fab. A similar relationship between *Dermestis lardarius* L. and the dead adults of several species of Calliphoridae has twice come to the attention of the writer in Alberta.

From 1924 to 1926 an unusual number of complaints were received regarding the invasion of houses by this Dermestid from the vicinity of Edmonton. My own house, which stands in a well wooded district, became somewhat heavily infested and this offered a good opportunity to ascertain the cause.

At this time the district was suffering from a severe outbreak of Forest Tent Caterpillars. Many trees were completely defoliated and large numbers of mature caterpillars migrated to buildings in search of suitable pupation sites. A favoured location for "spinning-up" was under window sills, and there were few windows in residential districts of which the sills were not lined with a dozen or more cocoons.

Many of the caterpillars or pupae died, owing to a variety of causes, in their cocoons. These attracted the flying adults of *D. lardarius* for oviposition. Numerous exuviae of their larvae are still to be found in these old cocoons. Many small larvae, either owing to a shortage of food or for some unascertained reason, left the cocoons and, wandering to the upper side of the sills, entered the house through the mosquito screen, the mesh of which is too large to exclude them.

Within a few days' time they were found in flour bins and in similar places. Adults were frequently seen on the outsides of the screens but the mesh was, of course, too fine to allow them to pass through.

With the termination of the outbreak of *M. disstria*, complaints regarding these insects have fallen off in this district but it is of interest to note that we continue to receive specimens of larvae and of adults captured in houses in the eastern part of the province, where the tent caterpillar is, at present, very numerous.

1.—Can. Ent. Vol. 60 p. 283, 1928.

A NEW SPECIES OF ODONTAEUS, DEJ. (COLEOPTERA).

BY J. B. WALLIS,
Winnipeg.

At the time of my study of the genus Odontæus (published in the Canadian Entomologist, May, 1928) there was before me a single female from Alabama which appeared to be different from anything else in the material.

As it did not seem wise to give a name to an unique female the specimen was returned to the sender, Mr. Ralph Hopping, with a note to the effect that it probably represented a new species. Now, through the kindness of Mr. Hopping and Mr. Loding, I have had the opportunity of studying a small series consisting of two males and four females and this has resulted in the description here given.

Odontaeus alabamensis sp. nov.

♂, *Shape and Size.*—Oblong-oval. Maximum width a little in front of middle. Length 8.35 mm. Width 5.50 mm.

Colour.—Red-brown above, nearly the same below. Antennal club lighter, tibia slightly darker than body. Strongly shining.

Clypeus.—About twice as wide as deep, broadly rounded at sides, feebly emarginate in front, a little more so than in *darlingtoni;* acutely and strongly margined, strongly rugose. Finely but distinctly carinate for about two thirds of depth, the carina elevated at middle of clypeus. Horn movable, subparallel, very feebly constricted in about basal third before expanding into the head; apex distinctly excavated below, front face moderately and sparsely punctate.

Thorax.—Anterior angles almost exactly right, a little more rounded, and the apex a little more deeply sinuate than in *darlingtoni.* Sides rapidly divergent for nearly half their length thence slightly rounded and convergent to posterior angles. Posterior angles very distinctly obtuse and widely rounded with base even less sinuate than in *darlingtoni.* (See Figure 3.) The coarse punctures quite deep and large in the depressions; a fine, sparse, but evident system of punctules throughout. Medial elevation at about apical third, moderate in width, closed in front with the ends of the transverse carina feebly prominent, its sides diverging slightly basally; central groove broad and shallow. Lateral foveæ deep and large, transverse, more widely separated from the thoracic base and with their greatest depth further forward than in *darlingtoni.* Lateral ridges prominent, rounded from back to front though more gradually in front.

Elytra.—Striæ moderately impressed, the outer ones the least so, the sutural but little, if any more than second. Strial punctures deeper, larger and closer throughout than in *darlingtoni* holotype, scarcely smaller apically or laterally. Intervals feebly convex, the minute punctules sparse but evident. Eleventh stria considerably abbreviated in front, fourteenth well curved away from margin basally.

Genitalia.—Outer lobes pale yellow, middle lobe but little if any darker except within the "hook." "Hook" short and narrow, "shank" feebly and gradually narrowed, very feebly sinuate above towards tip, almost straight below. (See Figure 1.).

♀, *Shape and Size.*—Much as in male but a little larger.

Colour.—Dark chestnut. Antennal club lighter, tibia slightly darker than body.

Clypeus.—Similar to male but as usual in the females, deeper.

Thorax.—Allowing for sexual differences, as in male, the transverse ridge moderately long, the lateral tubercles scarcely separated from ridge. The medial depression feeble, grooved, with few punctures. The usual puncturation deep and coarse, absent medially behind the transverse ridge where it is conspicuous in the *darlingtoni* allotype.

Elytra.—Striæ scarcely as deep as in male, not as deep as in *darlingtoni* allotype. Strial punctures much as in holotype but with a tendency to be spaced more widely on some of the striæ.

Holotype.—♂, Grand Bay, Alabama, iii. 08 H. P. Loding.

Allotype.—♀, Grand Bay, Alabama, June, H. P. Loding.

These two specimens through the generosity of Mr. Loding and Mr. Hopping respectively, remain in my collection.

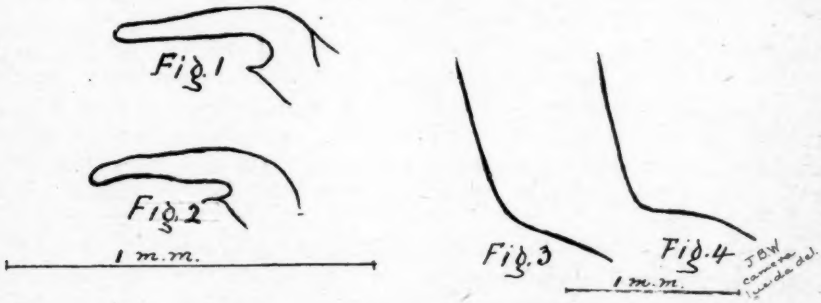


Fig. 1. Middle lobe of ♂ genitalia of *O. alabamensis* sp. nov. Fig. 2. Of *O. darlingtoni*, Wallis. Fig. 3. Posterior thoracic angle of *O. alabamensis*, sp. nov. Fig. 4. of *O. darlingtoni*, Wallis.

(Figures 3 and 4 are drawn from as nearly as possible the same point, viz., with the lateral thoracic ridge perpendicularly beneath the right eye).

This species is in very many ways extremely similar to *darlingtoni*, Wallis, and without much doubt depauperized females of the two species will prove difficult if not impossible to separate. The character that appears most reliable is the shape of the posterior thoracic angles, these being much more rounded and markedly more obtuse than in *darlingtoni*. (See Figures 3 and 4.)

If males are present the genitalia will settle the matter though even these indicate a very close relationship and appear to connect *darlingtoni* through *alabamensis* with the *filicornis group*.

The more even rounding of the middle lobe recalls the genitalia of *filicornis*, while its narrow "hook" resembles *darlingtoni*.

The space within the hook is, however, wider in *alabamensis* than in *darlingtoni*, while the shank is almost straight below, very little sinuate above, not down curved at the tip in the former; evidently sinuate above and bisinuate beneath with the tip down curved in the latter. A glance at the figures will make this clear. (See figures 1 and 2, and if possible refer to figures 6, 7, 8, Plate 14, Can. Ent., LX, 154, 1928).

In addition to the holotype and allotype, there is an unarmed male taken at Mobile Ala. X. 08 by H. P. Loding, which will be returned to its captor. It is, of course, not made a paraholotype as it lacks the secondary sexual characters. There are also three females, Mobile Ala. 3.iii.12, H. P. Loding; Mobile Ala.; Grand Bay, Ala. iv.12, H. P. Loding; which differ only in minor details from the allotype. These are marked para-allotypes and have been returned to Mr. Hopping and Mr. Loding. In the key to the species of Odontæus, (Can. Ent. LX, 126, 1928), *alabamensis* will run to couplet 7 with *darlingtoni* from which it may be separated by the characters already given. I am inclined to think, that *alabamensis* should follow *simi* in the cabinet with *darlingtoni* next and *cornigerus* and *liebecki* last.

NOTE ON A GENERIC TERM IN THE AGROTINAE (LEPID.)*

BY J. MCDUNNOUGH,

Ottawa, Ont.

In a recent article by Barnes and Benjamin (1929, Bull. Brook. Ent. Soc., XXIV, 177) the generic term *Trichofeltia* is proposed for the species *circumdata* Grt. By a rather curious coincidence I had erected the same generic term for the same species six months previously in my "Generic Revision of North American Agrotid Moths" which appeared as Bulletin 55 of the National Museum of Canada (April, 1929); this work does not seem to have been known to the above mentioned authors at the time of the preparation of their paper.

BOOK NOTICE

Principles of Forest Entomology. By Samuel Alexander Graham, Associate Professor of Forest Entomology, University of Michigan. McGraw-Hill Book Company, Inc., New York, 1929. Price $3.50, 339 pp., 149 text figures

The book is divided into 17 chapters. Chapters 1 and 2 include an introduction and a historical review of the development of forest entomology. Chapters 3, 4 and 5 present a discussion of forest insect ecology under the subjects of Biotic Potential, Environmental Resistance and Insect Abundance. Chapters 6 to 9 deal with the various phases of forest insect control Chapters 10 to 15 deal with the more injurious forest insects of North America under the headings: Leaf-eating insects; Meristem Insects of the Terminal Parts; Meriston Insects of the Cambium Region; Cambiumwood Insects; Wood Destroyers and Sap-sucking Insects. The Leaf-eating Insects are treated under the following titles: Defoliation. Types of Insect Defoliators; Lepidopterous Leaf Eaters; The Spruce Budworm—The Gypsy Moth—The Cankerworms; Coleopterous Leaf Eaters: The Elm Leaf-Beetle, The Poplar Leaf-beetle; Hymenopterous Leaf Eaters: The Larch Sawfly, The Pine Sawflies.

The author's aim is to present the life-history, habits and importance of an outstanding example in each group of forest insects, and no attempt is made to discuss the morphology and taxonomy or to present a complete discussion of any of the groups.

*—Contribution from the Division of Systematic Entomology, Entomological Branch Dept. of Agriculture, Ottawa.

Chapters 16 and 17 deal with Insectivorous Parasites and Insect Predators.

This text will be very welcome aid to teachers of Forest Entomology. It presents a valuable contribution to forest insect literature and will serve a very useful purpose in the class room.

ANNUAL MEETING ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Sixty-sixth Annual Meeting of the Entomological Society of Ontario will be held at the University of Western Ontario, on Thursday and Friday, November 21st and 22nd, 1929.

Titles of papers should be in the hands of the Local Secretary by November 1st. Please advise of time required for reading and whether lantern is needed.

A. W. BAKER, PRESIDENT,
Ontario Agricultural College,
Guelph

J. D. DETWILER, VICE-PRESIDENT
(Local Secretary)
University of Western Ontario,
London

R H. OZBURN, SECRETARY,
Ontario Agricultural College,
Guelph

Mailed Monday, November 4th.